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study of absorption spectra in the ultra-violet. It was not found advisable to use capillary tubes, nor to work at such low pressures as Friederichs did. The best results were obtained with end-on tubes, from 5 to 10 mm. in diameter and about 30 cm. long, with quartz windows, and at pressures in the neighborhood of 5 mm. The necessary exposure varies from 5 minutes to an hour, according to the width of the slit, the absorptive power of the medium, etc. I have obtained a beautiful photograph of the absorption spectrum of benzol vapor with fifteen minutes' exposure.

E. P. LEWIS

UNIVERSITY OF CALIFORNIA,
May 18, 1915

THE IOWA ACADEMY OF SCIENCE

THE twenty-ninth annual session of the Iowa Academy of Science was held in the Hall of Physics, State University of Iowa, Iowa City, on April 30 and May 1, 1915. Over one hundred members were registered. At the opening session on Friday afternoon, after the transaction of preliminary business, the president, Professor H. S. Conard, called for the presentation of papers of general interest. At 4 P.M. the academy separated into sections for the further reading of papers as follows: section one, botany; section two, physics, chemistry and mathematics; section three, zoology, geology, psychology, medicine.

Professor Ellery W. Davis, of the department of mathematics in the University of Nebraska, gave the annual address on the subject "Uncertainties," a discussion of the foundations of exact knowledge.

On Saturday morning the sections resumed their meetings, except that the Iowa section of the American Chemical Society met independently. At the business meeting the following officers were elected for the coming year.

President: Harry M. Kelly, Mount Vernon.

First Vice-president: G. W. Stewart, Iowa City.

Second Vice-president: Charles R. Keyes, Des Moines.

Secretary: James H. Lees, Des Moines.

Treasurer: A. O. Thomas, Iowa City.

The sectional meetings were so successful that a continuation of the plan was decided upon for the next annual meeting.

Luncheons were enjoyed on Friday evening by the geologists and geographers as guests of Dr.

and Mrs. Kay, by the mathematicians and by the physicists. A general luncheon was participated in by the members of the academy on Saturday noon, following the business session.

Program

(Abstracts are by the authors.)

Preliminary Notes on Nectar Production: L. A. KENOYER.

An Anomalous Hickory-nut; An Exobasidium on Armillaria; The Role of Soil Fungi: GUY WEST WILSON.

The Forest and Shrub Flora of Western Iowa: L. H. PAMMEL, G. B. MACDONALD AND H. B. CLARK.

This paper discussed the distribution of trees and shrubs of the drainage basin of the Missouri River and some of its tributaries. A number of southern species like *Cercis canadensis* and *Asimina triloba*, *Quercus acuminata* and *Vitis cinerea* reach their northern distribution in Fremont County.

The Weed Flora of the Lake Superior Region Compared with the Weed Flora of Iowa: L. H. PAMMEL.

A brief comparative study of the distribution of weeds of the northern lake region and the prairie region of Iowa.

Some Comparative Germination Tests of Sweet Clover: H. S. DORY.

A test of the germination of sweet clover treated with sulphuric acid, scratching, freezing and the Hughes method. It was found that scarification, freezing and the acid hastened the germination of seeds.

The Flora of the Ledges, Boone County, Iowa: WM. DIEHL, presented by L. H. PAMMEL.

A systematic catalogue of the spermatophytes and ferns of the ledges comprising a small area of Carboniferous sandstone along Pease Creek, a small stream which empties into the Des Moines. In this region occur a number of species of local range like *Quercus acuminata*, *Dirca palustris*, *Juniperus virginiana*, *Physocarpus opulifolius*, *Lathyrus ochroleucus*, *Trillium nivale*, etc.

The Flora of the East Slope of the Cascade Mountains in Crook County, Oregon: MORTON E. PECK.

The paper discusses briefly the general distribution of the flora on a line drawn across the Cascade Mountains in central Oregon, then takes up more in detail the plants occurring on the lower portion of the eastern slope, namely, at the town of Sisters. A study of these indicates that the locality is

typically arid transition. There follows an annotated list of plants recorded by the writer on a trip across the arid transition in this section of the state in July, 1914.

Flora of the Racing River Region: HARRIETTE S. KELLOGG.

In August, 1914, the writer collected plants along the south bank of the Rainy River near the "Old Dock" in the city of International Falls, Minnesota.

The territory explored consisted of a timber belt lying back from the river and cleared ground still back of this.

The timbered belt consisted largely of birches, poplars, maples and other deciduous trees interspersed with cedars and spruces and species of an arborescent nature. Underneath was the characteristic forest herb flora; the cleared ground was covered with introduced plants of a weedy character; there was an almost entire absence of strand flora. East of the dock was a luxuriant growth of tame grasses and clovers, the seed of which had been scattered when grain was carried to the dock for transportation by boat.

A few species are listed that were collected from the Canadian bank of the river, several from the Rainy Lake region and a few from the west bank of the Winnipeg River.

Economic Seaweeds of Alaska (illustrated): ROBERT B. WYLIE.

A brief statement of the findings of the U. S. Kelp Expedition which made a survey of the potash-yielding seaweeds of southeastern Alaska during the summer of 1913.

A Hybrid Ragweed (illustrated): ROBERT B. WYLIE.

The description of a hybrid, probably a cross between *Ambrosia artemisiifolia* and *A. trifida*, found near Iowa City during the summer of 1914.

The Distribution of Forest and Prairie in the Lake Region of Iowa (with lantern slides): B. SHIMEK.

The Okoboji region is discussed. The groves appear uniformly on, or in the shelter of abrupt slopes or in rough areas consisting of a group of ridges or knobs. They are found on the leeward side of abrupt slopes anywhere about the lakes; but they occur on the windward side only on the east and north sides of the larger lakes. In the latter case the establishment of a forest seems to be made possible by the piling up of vapors under the banks on the windward side.

The Lichen Flora of the Prairies of Northwestern Iowa: B. SHIMEK.

This consists largely of xerophytic species attached to boulders. Few earth forms occur. The rock forms are most abundant on dry knolls and in exposed places. A comparison of this flora is made with that of the xerophytic borders of prairie burr oak groves. An annotated list of the species is included.

The Ecological Histology of Certain Prairie Plants: ELLA SHIMEK.

The paper discusses the xerophytic adaptation of certain species of prairie plants in detail.

Pioneer Plants on a New Levee: FRANK E. A. THONE.

A description of the plants appearing on a newly exposed surface in Des Moines, Iowa, during the first season after exposure, with remarks concerning their possible origin.

The Index of Foliar Transforming Power as an Indicator of Permanent Wilting of Plants: A. L. BAKKE.

Some Well-known Building Stones: NICHOLAS KNIGHT.

An analysis was made of the Anston Stone, from Kiveton Park, England, the material of which the Houses of Parliament are built, to learn, if possible, the cause of the crumbling of the rock. It proved to be a dolomite, of a light buff color, with a specific gravity of 2.6.

The red sandstone from the Vosges Mountains, of which many public and private buildings in Alsace-Lorraine, including the Strassburg Cathedral, are constructed, was studied. The rock is a hard, durable building material and lends itself to delicate carvings, as shown by the fine Gothic of the tower and façade of the cathedral.

The "Hard Jewish," a compact rock from Solomon's quarries, Jerusalem, with a specific gravity of 2.7, also was analyzed.

A New Apparatus for Regulating Temperatures for Work in Polarimetry and Refractivity; Electrical Conductivity of Solutions of Silver Nitrate in Water and Pyridine and in their Binary Mixtures (preliminary paper): J. N. PEARCE.

A Convenient Standard Cell—(Cu—Hg)—CuSO₄—Hg₂SO₄—Hg: DIEU UNG HUONG AND J. N. PEARCE.

Some Derivatives of 4-nitro-5-methyl-2-sulphobenzoic Acid: WM. J. KARSLAKE AND P. A. BOND.
Comparison of Some Standards in Acidimetry and Alkalimetry: W. S. HENDRIXSON.

Studies on Barium Sulfate: P. L. BLUEMENTHAL AND S. C. GURNSEY.

A Comparison of Some Kjeldahl Methods for Nitrogen Determination: P. L. BLUEMENTHAL AND G. P. PLAISANCE.

The Ste. Genevieve Formation and Its Stratigraphic Relations in Southeastern Iowa: STUART WELLER AND FRANCIS M. VAN TUYL.

Recent field studies have shown that the Pella limestone, which was formerly regarded as the uppermost subdivision of the St. Louis, is formationally distinct, being separated from the true St. Louis beneath by an unconformity and a remarkable basal sandstone. The previous reference of this member to the Ste. Genevieve upon the basis of its fauna is, therefore, borne out by the field evidence.

The Occurrence and Origin of the Iron Ores of Iron Hill, Near Waukon, Iowa: JESSE V. HOWELL. Introduced by G. F. KAY.

The Extension of the Wisconsin Drift Southwest from Des Moines: JOHN L. TILTON.

This newly recognized area of Wisconsin drift extends from Valley Junction just west of Des Moines for five miles to the south. In all directions, east, south and west, from this strip, now only about a mile wide, the topography is that of a typical area of Kansan drift.

The Age of the Terrace South of Des Moines, Iowa: JOHN L. TILTON.

A low terrace is very noticeable near Des Moines and along streams flowing into the Des Moines from Warren County. The topographic maps give evidence of a similarly related terrace further southeast and then north along the Mississippi River to within the area of Wisconsin drift in that part of the state. The terrace is composed of sand and gravel forming a continuous deposit to a depth of thirty feet, post-Wisconsin in relation, and with Wisconsin or post-Wisconsin fossils: Bison, Rangifer, Symbos.

The First Coal-washing Plant in Iowa; The Mineral Industry in Iowa During the Past Decade: GEORGE F. KAY.

The Occurrence of Barite in the Lead and Zinc Districts of Iowa, Illinois and Wisconsin: W. D. SHIPTON.

Precise Criteria of Terranal Correlation: CHARLES KEYES.

The signal failure of our state and federal geological surveys to give us working classifications of local geologic formations that are readily ad-

justable to the general continental scheme has recently led to the adoption by the various bureaus of somewhat arbitrary methods in order to make published records immediately available. In casting about for a suitable area for which to construct a generalized section of local rocks the quadrangle, as ordinarily selected, appears to be much too small to be of any real service. The county is likewise too limited in extent. In size the state seems to be most satisfactory for trial tests in continental problems of exact correlation. A number of these generalized state sections reduced to identical taxonomic schemes are compared.

Mountain Structures in Plains: CHARLES KEYES.

The larger tectonic features of the substructure of the prairie region of the continental interior are of unusual interest because of the fact that well-defined mountain structures are now discovered here for the first time. A carefully constructed geologic cross-section extending from the northwest corner of Iowa to the southeast corner of Missouri presents one of the most perfect synclinoria known. Within this remarkable basin are preserved our great coal deposits.

At the north end of this synclinerium is the structural remnant of old Triassic mountains, a range which in its prime was comparable to the Appalachians of to-day. At the south end is the Ozark dome of Tertiary date. Associated with the great trough is a noteworthy system of profound dislocations.

Exhumed Sea-coasts: CHARLES KEYES.

A curious geologic coincidence occurs on the shores of Puget Sound. There has been in this region during late geological times more or less oscillation of the land. In a previous cycle the hard igneous rocks were carved out by the waves into low, irregular sea-cliffs. On the sinking of the islands sands and gravels covered this belt to considerable depths. To-day, with a marked uprising, the new shore-line is contraposed on the ancient one. In a quite remarkable way the latter is being now exhumed by the action of the waves.

Progress Report of Physiographic Work in the Driftless Area: A. C. TROWBRIDGE.

The Paleontology and Stratigraphy of the Upper Carboniferous of Iowa: GEORGE L. SMITH.

The Loess of Peczel, Hungary (with lantern slides): B. SHIMEK.

A discussion of true loess and an underlying water deposit which has been classed as loess. The true loess contains a strictly terrestrial molluscan

fauna, and in some places is divisible into a lower gray, and an upper yellow division, not unlike those which are common in this country.

The fauna of the lower, horizontally stratified deposit is mixed, consisting of both land and fresh water mollusks. This part is not loess, and is clearly aqueous.

Leaching of the Pleistocene Drifts of Eastern Iowa: MORRIS M. LEIGHTON.

This paper is a discussion of the process of leaching of the calcareous constituents of the drift in the area above stated. Attention is called to the fact of a narrow transition from the leached zone into the calcareous where limestone pebbles reach their normal abundance, and the contention is set forth that this may be a factor of slow percolation and rapid saturation. The contention is also set forth that the bottom of the zone of leaching in the young drifts may not mark the so-called permanent ground-water surface, as is commonly assumed, but that it may well be above the latter.

Some Unique Niagaran Cephalopods; A New Crinoid Fauna from Monticello, Iowa; High Level Gravels in Floyd County, Iowa: A. O. THOMAS.

The Inheritance of Syndactylism: HENRY ALBERT.

An instance of thirteen cases of syndactylism (or fused or webbed fingers or toes), traced through four generations was reported. The element of heredity is obviously apparent. In view of the recent report of a family with cases of syndactylism in which the inheritance of the abnormal union of the digits apparently conformed to Mendel's law, as a dominant character, an effort was made to determine if the Mendelian law also applied to the cases in question. It was determined that although the disease was due to a factor which was apparently dominant rather than recessive, it did not conform entirely to Mendel's law. That it is not due to a Mendelian recessive character is shown by the fact that in three instances the disease appeared in children, neither of whose parents were affected by it, and in each instance the family history of at least one of the parents was negative for the disease in question. To have a disease due to a recessive character appear in an individual, neither of whose parents are affected by it, we must assume that both parents are hybrids as regards the condition in question.

Nor does it entirely conform to a Mendelian dominant character, since if it did we would expect that if the disease appeared in the offspring it should be present in at least one of the parents.

It is probable that the explanation for the lack of conformity of our cases to Mendel's law is due to an inhibition of the activity of the determiner for the disease in question by some other factor, causing the disease in such cases to be latent. The absence or non-operation of such inhibiting factor may again cause the disease to appear.

The Effect of Alcohol on the Liver as Shown Experimentally: A. L. GROVER. Introduced by HENRY ALBERT.

The Effect of Change of Lamp Voltage on Vision: WM. KUNERTH.

This paper is an experimental determination of the change of lamp voltage permissible before it is noticed, as also of the change permissible before it really becomes objectionable to the patron. The permissible change of voltage for the different sizes of carbon lamps is determined, as also the permissible change for vacuum tungstens and nitrogen-filled tungstens.

A Simple Device for Demonstrating the Tempered Scale: L. B. SPINNEY.

An Attempt to Detect a Change in the Heat Conductivity of Selenium Crystals Under the Influence of Light: L. P. SIEG.

Notes on Certain Elastic Peculiarities of Phosphor Bronze Wires: L. P. SIEG AND A. J. OEHLER.

On the Wave-length-sensibility Curves of Isolated Crystals of Selenium Between Wave Lengths 2000 Å. U. and 4500 Å. U.: F. C. BROWN AND L. P. SIEG.

A Design for Electrical Regulation of High-temperature Ovens; Notes on Production, and Some Electrical Properties of Tellurium Crystals: W. E. TISDALE.

A Resonance Method for Measuring the Phase Difference of Condensers: H. L. DODGE.

The Theory of Binaural Beats.—An Experimental Contribution: G. W. STEWART AND HAROLD STILES.

The experiments here reported were performed in order to secure evidence concerning the cause of the additional maxima which occur in binaural beats.¹ These additional maxima occur at certain phase differences, and the change in these phase differences should depend upon the frequency of the tones, but not upon the frequency of the beats. If the additional maxima are caused by interaural conduction then, as it can be shown, the phase differences should vary as the frequencies. If the data are plotted, instead of the straight line which

¹ See G. W. Stewart, *Physical Review*, Series 2, 3, p. 146, 1914, for a description of the phenomena.

should obtain in the case of interaural conduction, we have a curve which is far from a straight line.

After much consideration of theories involving interaural conduction, none seems to be in agreement with the evidence here shown.

The Absence of Liberation or Absorption of Electrons During a Change from the Conducting to the Non-conducting State: L. E. DODD.

Crystals of metallic selenium were melted in a metallic cup attached to a sensitive electroscope. The heating agent was a focus of sun's rays supplied by a convex lens; this method of applying heat was used in preference to flames, which possess high ionizing powers. Previous to the change of state of the selenium the electroscope was given a negative charge. During the time required for the change of state a certain deflection of the electroscope leaf was observed. With the crystals removed from the cup, and the sun's rays focused at the same point as before, two comparison readings were made over time intervals equal to that required for the change of state. Changes of deflection resulted of similar magnitude to that first observed.

The experimental conclusion is that in metallic selenium, when it changes by melting from the crystalline and conducting form to the amorphous and insulating form, electrons are neither absorbed from, nor liberated to, the surrounding medium, in any very appreciable amount.

The Crystal Optiphone in its Adaptation to Enable the Blind to Read the Printed Page through Ear Impressions: F. C. BROWN.

The Variation, with Temperature, of the Light-sensitiveness of Selenium Crystals: KATHRYN J. DIETERICH.

The Wave-length Sensibility Curves of Selenium Blocks: E. O. DIETERICH.

Psychology Applied to the Improvement of Control of the Pitch of the Voice in Singing: CARL J. KNOCK. Introduced by C. E. SEASHORE.

Psychology Applied to Measurement of Merit in Advertisements: HARRY H. GOULD. Introduced by C. E. SEASHORE.

The Psychogram in Vocational Guidance: C. E. SEASHORE.

A Bacteriological Study of the Wells of Toledo, Iowa: W. H. LAUDERDALE AND L. A. KENOYER.

Preliminary Notes on the Animal Ecology of Johnson County: D. M. BRUMFIEL. Introduced by GILBERT L. HOUSER.

This paper is based on an early spring survey

of the forms of animal life found in a small stream. The rapids and pools are discussed with a division of the species into particular animal associations. The species have been catalogued with brief notes as to habits and a table has been prepared giving in concrete form the distribution, food habits and relative abundance of each species.

*On the Lymphatic System of the Common Rat (*Epimys norvegicus*):* THESLE T. JOB.

From fifty injected specimens, the gross anatomy of the common rat has been studied and outlined. The results of the work have further proven the studies of McClure and Silvester on the lymphatico-venous communications in the jugulo-subclavian district, and of Silvester on the renal vein communications, and have established two additional communications, the portal vein connection and the ilio-lumbar vein connection. The main circulation and disposition of the lymphatic system has been determined and the need of further knowledge concerning the histology of the lymph nodes, of which there appear to be two types, is pointed out.

Notes on the Development of the Lymphatic System of Turtles: FRANK A. STROMSTEN.

The Present Status of the Hessian Fly in Iowa: R. L. WEBSTER.

Tracheal Capillaries of the Grasshopper: L. S. ROSS.

The Inheritance of Fertility in Swine: EDWARD N. WENTWORTH.

Is the Appetite of Swine a Reliable Indication of Physiological Needs? JOHN M. EVVARD.

Notes on Iowa Pentatomoidea: DAYTON STONER.

The Crow: FRED BERNINGHAUSEN.

On Snakes "Swallowing" Their Young: E. D. BALL.

A common garter snake was frequently seen to "swallow" her young. The little snakes would often push their heads out of the mother's mouth and thrust out their little tongues.

The Building and Function of the College Museum: B. H. BAILEY.

Notes on the Distribution of the Prairie Spotted Skunk in Iowa: B. H. BAILEY.

Ictinia mississippiensis in Nebraska: B. H. BAILEY.

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JAMES H. LEES,
Secretary